



CBM Program Update DA & OSD Senior Leaders

Topics for 30 Nov 2004

- **OSD Policy and Army Guidance**
- **CBM Program Objectives**
- **Commander's Guidance**
- **Stakeholders/Enablers**
- **Proof of Principle**
 - **Mission**
 - **Products**
 - **Process**
 - **CBM Data Management**
- **CBM Transformation Milestones**
- **Summary**

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DSS-0228 - CBM (OSD) - 11/29/2004



OSD Policy and Army Guidance

- **DOD - Policy Letter for CBM Dtd: 25 Nov 2002**
 - Guidance and Directive to Services to Examine, Evaluate, and Implement CBM
 - CBM Shall Be Implemented to Improve Maintenance Agility, Responsiveness, and Increase Readiness With Reduced Life Cycle Ownership Cost
- **DOD - CBM Memorandum Dtd: 20 Nov 2003**
 - Develop CBM As One of Six Future Logistics Enterprise Initiatives
 - Created the Maintenance Technology Senior Steering Group (MTSSG)
- **Army CBM Plus Plan Dtd: 14 Apr 2004**
 - Shifts From Preventive and Reactive Maintenance to Proactive CBM
 - Affirms the Goal of the Common Logistics Operating Environment (CLOE) to Provide Combatant Commanders With Higher Equipment Availability Using Fewer Resources
- **DA, G4 - Draft Army Aviation White Paper On CBM Plan Dtd: 10 Nov 2004**
 - Stated That Task Force- Aviation Was One of Sixteen Army Focus Areas
 - Task Force Aviation Goal Is to Achieve Full CBM Within Aviation By End of FY 2015
 - Identifies Responsibilities of Stakeholders Within Aviation Community



CBM

... Turning Data Into Maintenance Action!

Condition Based Maintenance Defined

...

OSD/Army: CBM Is a Set of Maintenance Actions Based on Real-time or Near-real Time Assessment of Equipment Condition, Obtained From Embedded Sensors and/or External Measurements or Tests

To the Commander: The Ability to Meet Mission Requirements With Proactively Driven Maintenance; Increasing Operational Availability --*CBM Proof of Principle Team*

To the Soldier: The Ability to Convert Data on Aircraft Condition and Usage Into Proactive Maintenance Action, Reducing Maintenance Workload -- *CBM Proof of Principle*



CBM Program Objectives

- **Use Real-time Assessments of Material Condition Obtained From Embedded Sensors and Other Data Sources to Improve Diagnostics and Prognostics Capabilities**
- **Increase Operational Availability for the Warfighter**
- **Reduce the Maintainers Workload**
- **Convert Unscheduled Maintenance to Planned Maintenance**
- **Achieve IOC By 2011 IAW CSA Intent; FOC 2015**



AMCOM Commander's Guidance

Guidance:

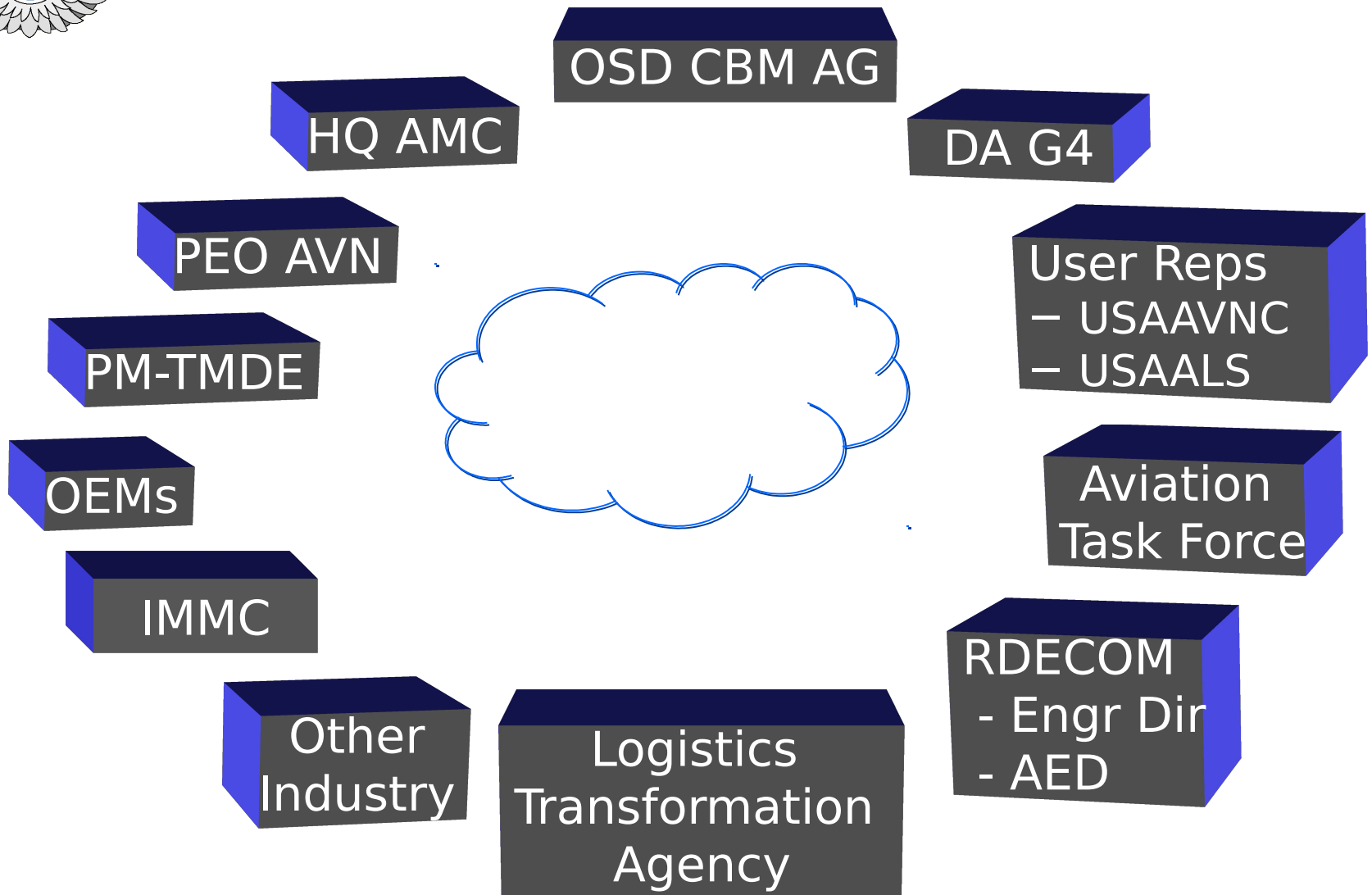
- **CG, AMCOM Serve As the Lead to Transform Army Aviation to CBM**
- **Identify the Stakeholders and Build Consensus**
- **Develop a Long Range Plan**
- **Develop Funding Requirements for FY 06 and FY 07-11 Program Change Proposal**
- **Report Progress Monthly**

"This Opportunity, Has the Potential to Significantly Increase the Operational Readiness of Our Aircraft and Reduce the Maintenance Burden on Our Soldiers. You Are the Team to Make This Happen. I Thank You for Your Involvement and Dedication."

MG James H. Pillsbury, Commander, Aviation/Missile Life Cycle Management Command



The Stakeholders ...





CBM Enablers

1. World Class Change Management

2. Digital Source Collectors

- Open Architecture
- Non Proprietary Data
- Efficient Download and Transfer
- Reliable, Simple Translation Into Engineering Units (Relational Data)

3. Reliable Data Warehouse

- Multiple Sources and Data Types
 - DSCs - Vibration and State Data
 - ELAS - Maintenance Actions
 - ELAS - Parts Tracking and Usage History
- Multiple Customers
 - Different Needs for Data Granularity
 - Different Needs for Information

4. Closed Loop Information System

- Data (for Engineers)
 - To Information (for Analysts)
 - To Knowledge (for Planners)

o To Maintenance Action! (for Commander/Soldiers)

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CBM Proof of Principle

- **Mission:**

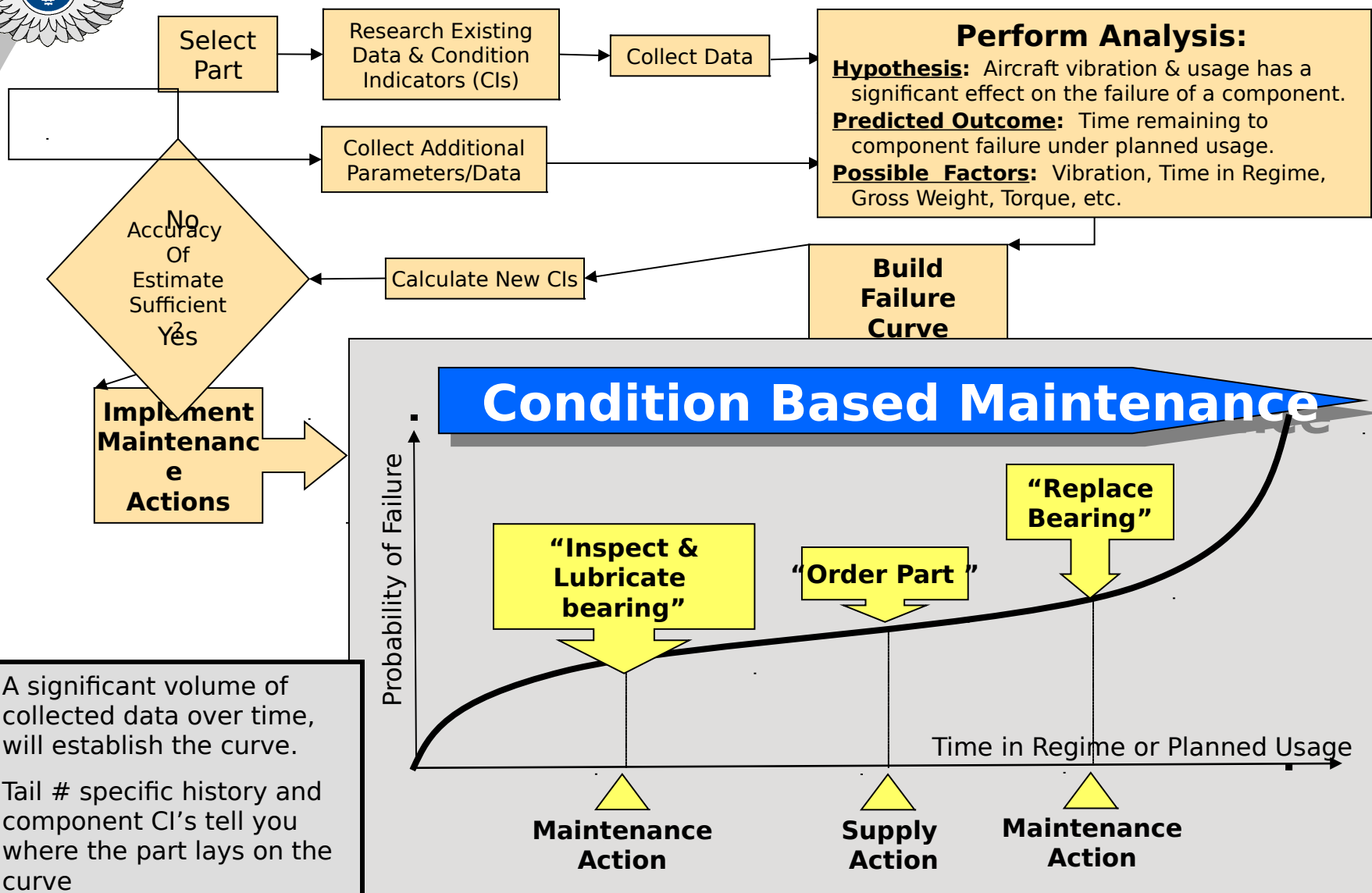
“In Support of the Transformation of Army Aviation to CBM, Demonstrate the Feasibility of Converting Condition and Usage Data Into Maintenance Action”

- **Products:**

- ☑ **Sample Components From Each MDS**
- ☑ **Data Sources for Each Component By Aircraft**
- ☑ **Analytical Methods**
 - **Collaborated Analytical Methods (With AED)**
 - **Draft Charter in Staffing**
 - **A Proof of Principle Data Warehouse By 31 Jan 05**
 - **Condition / Usage Data Into Maintenance Action By Jul 05**



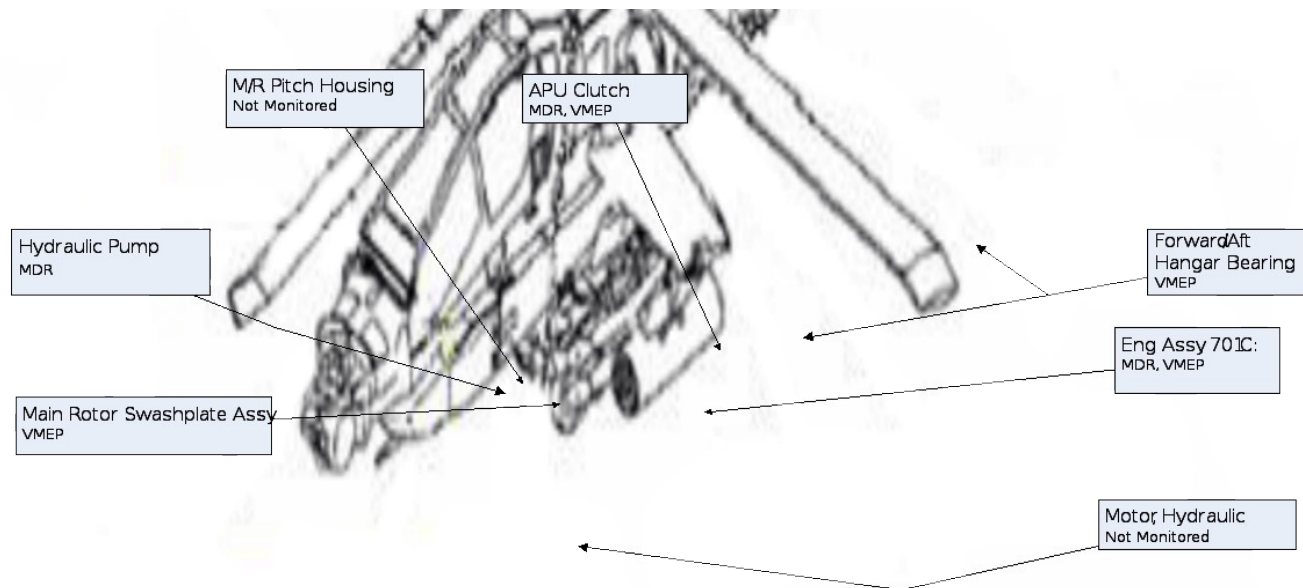
CBM Proof of Principle Process





AH-64 Parts Selected

Status: Finalized



AH-64 Consensus

- ✓ AED
- ✓ PMO
- ✓ CBM Proof
- ✓ ATTC
- ✓ DSC OEM

Type Component Fatigue Life Limited	Monitoring Method	Vibration	Active Monitoring (Non-vibration)	Passive Monitoring (Inspection, Sampling, Data)
		M/R Swashplate,		M/R Pitch Housing
TBO		APU Clutch, Fwd/Aft Hanger bearing		
On Condition			Engine Assy, 701C Hydraulic Pump	Motor, Hydraulic (Gun)

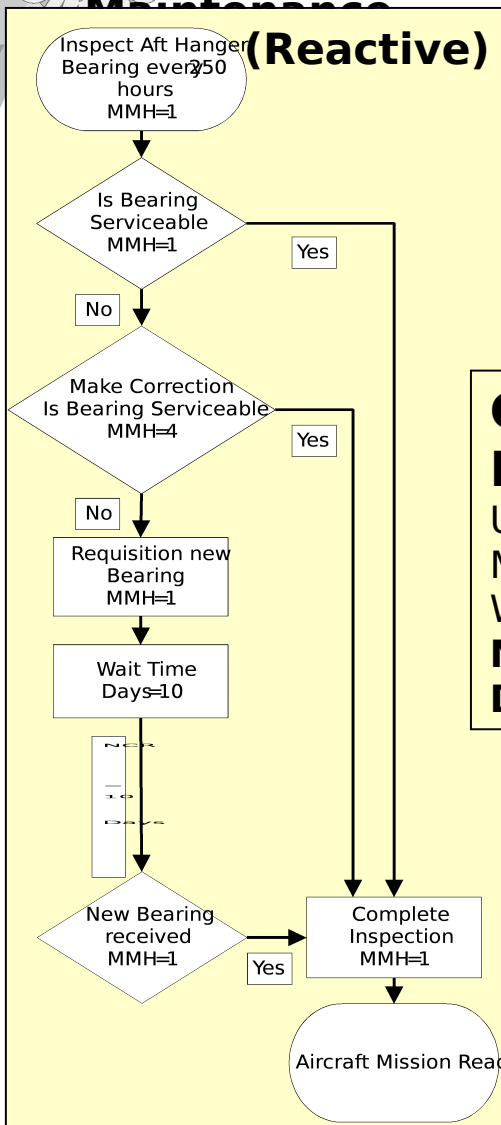
DSS 0228 CBM (OSD) 11/29/2004



Potential CBM Benefit AH-64 Aft Hanger Bearing

Current Preventive Maintenance

(Reactive)



Assumptions:

- No Fault Found During 1st Two Inspections
- Inspection Interval Is 250 hours
- MTB Repair is 537 hrs
- Part Time Change is 2500 Hrs
- **Part Not on Hand**

Current Maintenance

Unscheduled Failure

MMH = 18 Hrs

Wait Time = 10 Days

Not Combat Ready

Days

CBM Potential

No Unscheduled Maintenance

MMH = 5 Hrs

Wait Time = 0 Days

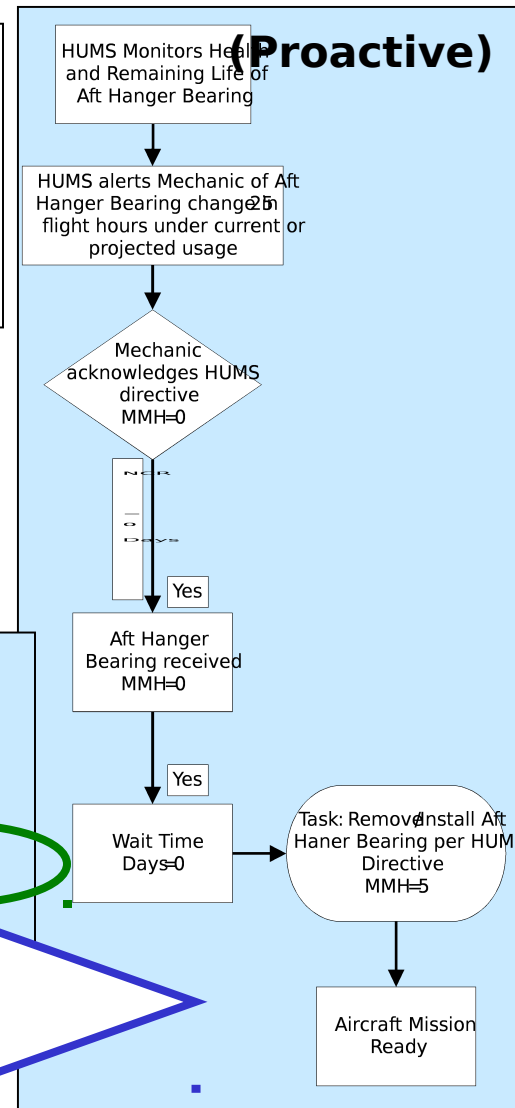
Not Combat Ready = 0

CBM Potential:

- 13 Fewer Hours of Maintenance
- 11 More Days of Availability

CBM Potential

(Proactive)



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AH64 A&D Opportunities

Data Types

- **Today - No Significant In-theater Data Collection Capability**
- **CBM Progress Requires at Least 4 Data Types**
 - ❑ **Vibration - Fault Detection of Monitored Components**
 - ❑ **State and Usage Data - Maneuvers, Stress Accumulation, Conditions**
 - ❑ **Parts Tracking Info - Part ID and Usage History**
 - ❑ **Maintenance Activity - Details on Component Change Out**

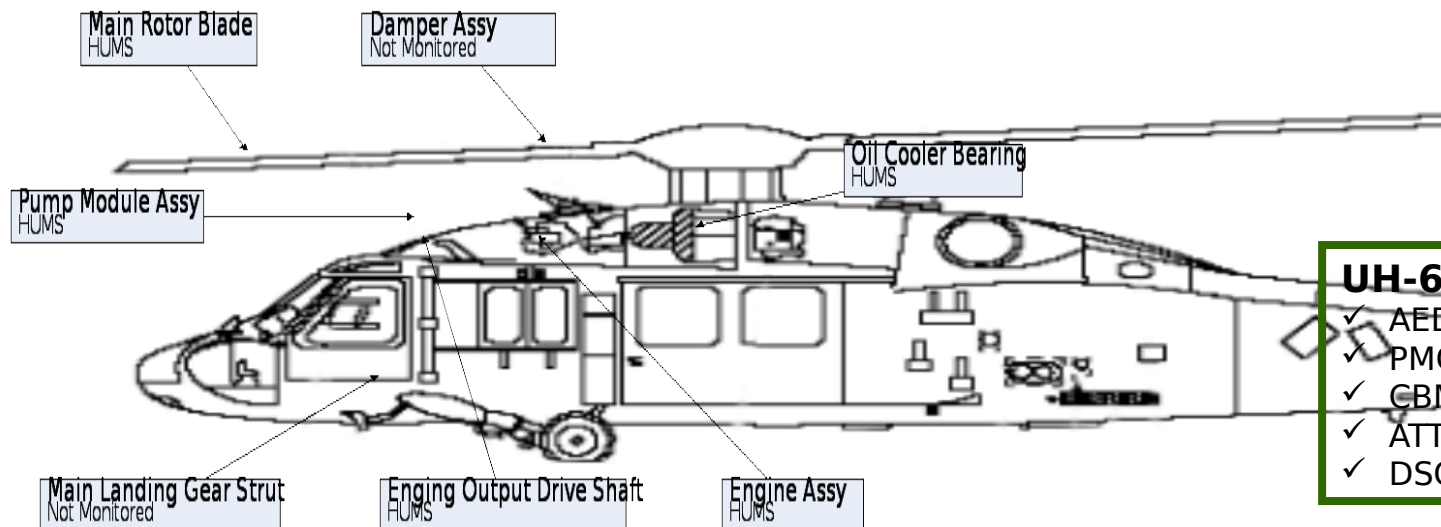
Units

- **AH64D Unit Deploys to OIF With Data Collection Capability**
- **AH64A Units With VMEP in SC NG**



UH-60 Parts Selected

Status: Finalized



UH-60 Consensus

- ✓ AED
- ✓ PMO
- ✓ CBM Proof
- ✓ ATTC
- ✓ DSC OEM

Type Component \ Monitoring Method	Vibration	Active Monitoring (Non-vibration)	Passive Monitoring (Inspection, Sampling, Data)
Fatigue Life Limited	M/R Blade, Oil Cooler Bearing		
TBO			
On Condition	Engine Output Drive Shaft	Pump Module Assy Engine Assy	Damper Assy, Main Landing Gear Strut

Transforming Army Aviation to Condition Based Maintenance (CBM)!



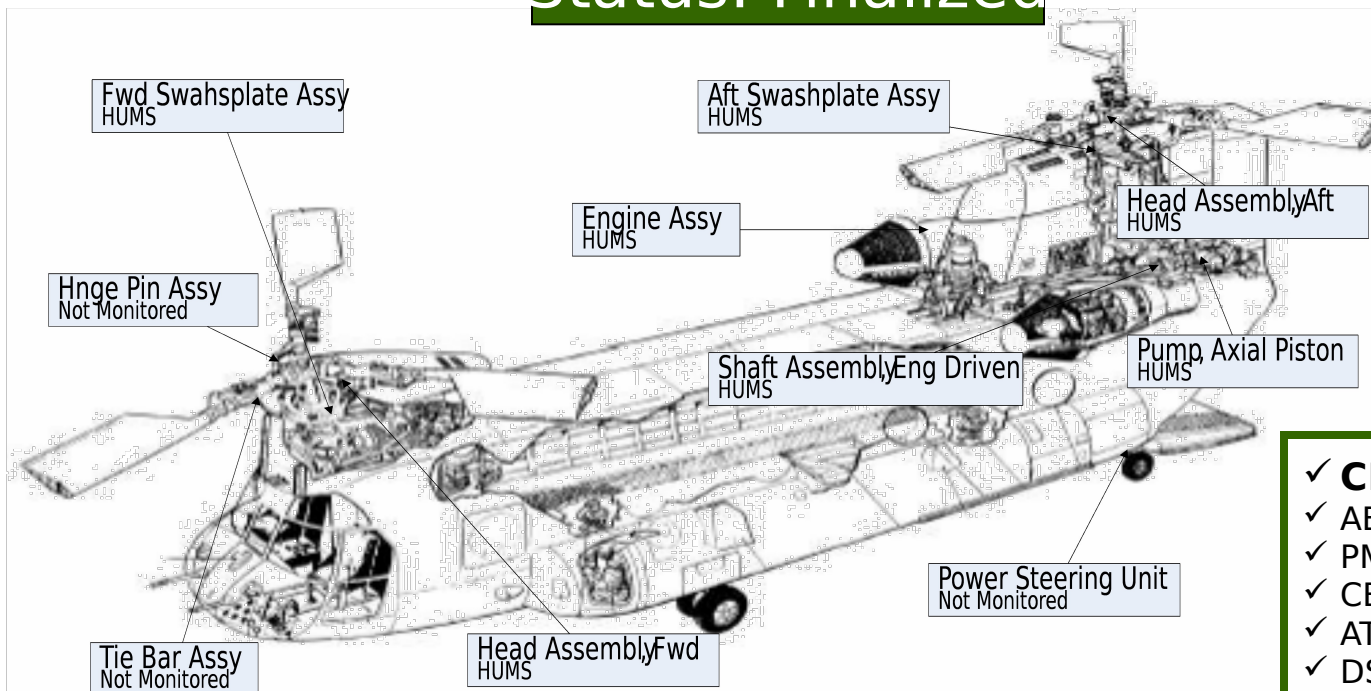
UH60 A&L Opportunities

- **Required Data Types**
 - ❑ **Vibration - Fault Detection of Monitored Components**
 - ❑ **State and Usage Data - Maneuvers, Stress Accumulation, Conditions**
 - ❑ **Parts Tracking Info - Part ID and Usage History**
 - ❑ **Maintenance Activity - Details on Component Change Out**
- **4th Battalion 101st AASLT Division**
 - **UH60Ls Equipped With IMD HUMS**
- **1-52 Aviation, 8th US Army**
 - **UH60As With VMEP**
- **SC National Guard,**
 - **UH60As With VMEP**



CH-47 Parts Selected

Status: Finalized



- ✓ **CH-47 Consensus**
- ✓ AED
- ✓ PMO
- ✓ CBM Proof
- ✓ ATTC
- ✓ DSC OEM

Type Component	Monitoring Method	Monitoring Method		
		Vibration	Active Monitoring (Non-vibration)	Passive Monitoring (Inspection, Sampling, Data)
Fatigue Life Limited		Shaft Assy, Engine Driven		Tie Bar Assy
TBO		Fwd/Aft Swashplate Assy, Fwd/Aft Head Assy	Engine Assy	Hinge Pin Assy
On Condition		Pump Axial Piston	Power Steering Unit	

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Transforming Army Aviation to Condition Based Maintenance (CBM)!

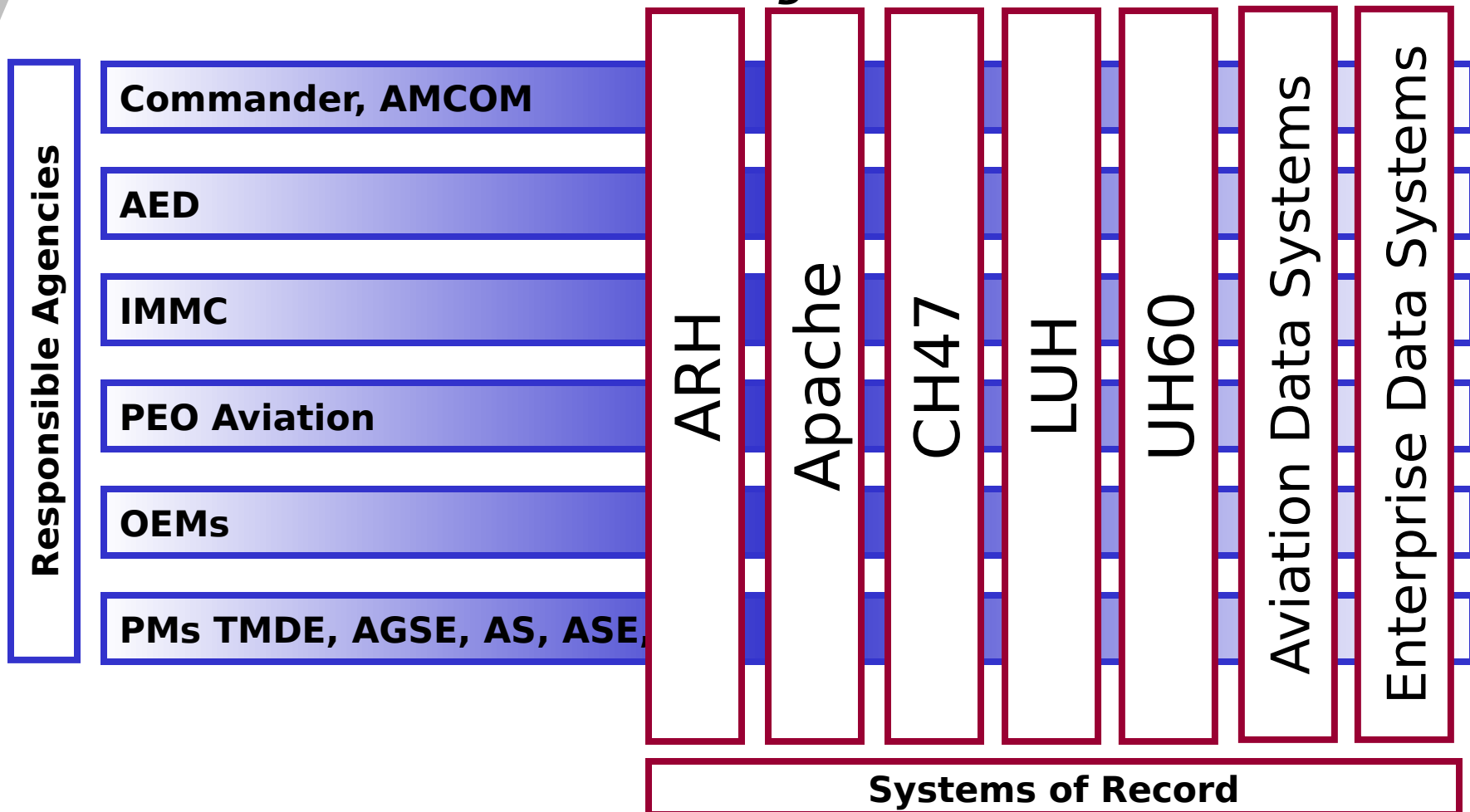


CBM Data Management



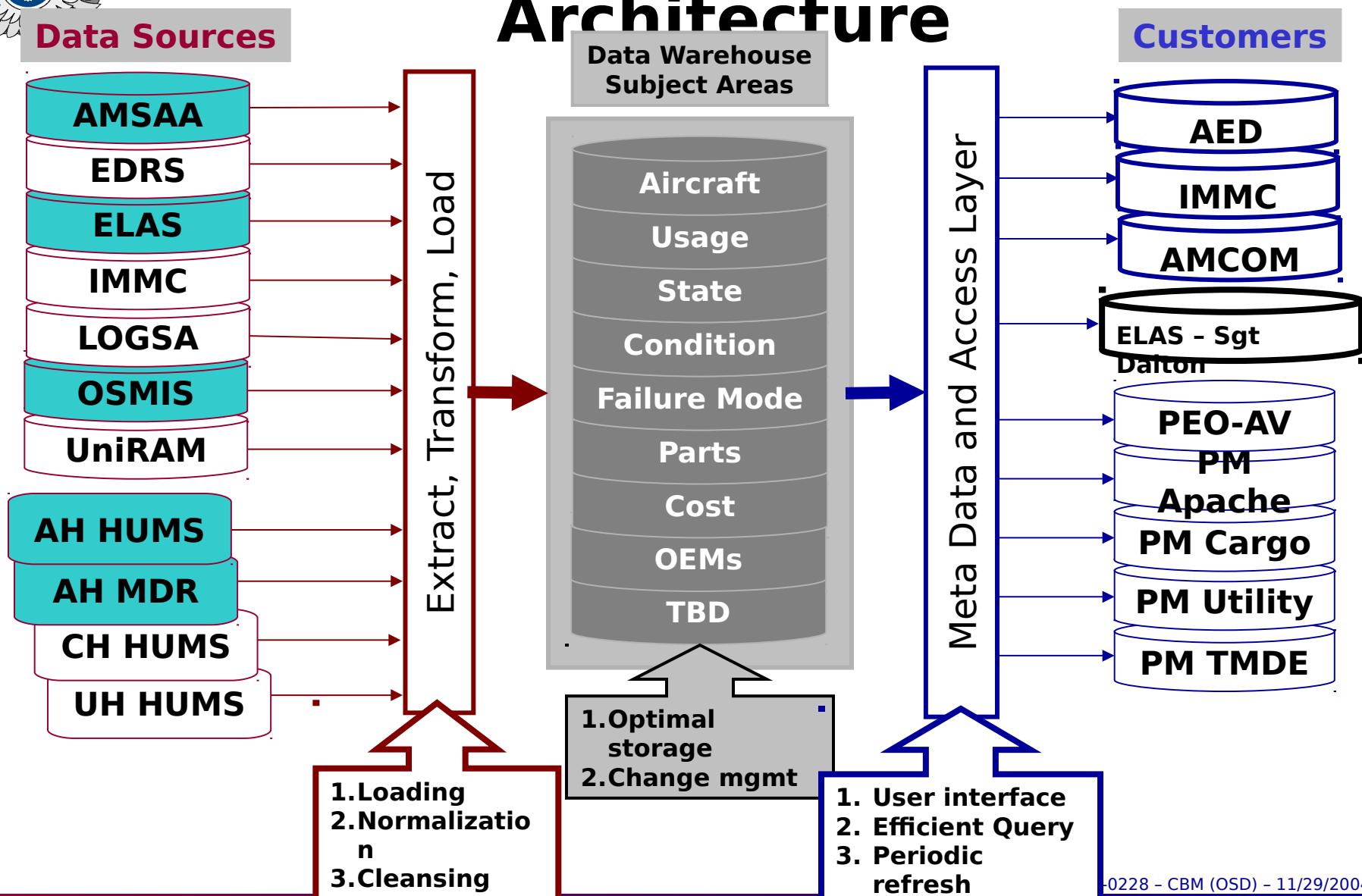
We Are Vertically Challenged

How Do We Provide Horizontal Views of Data Stored in Different Places - in Different Formats - Under Different Management ?



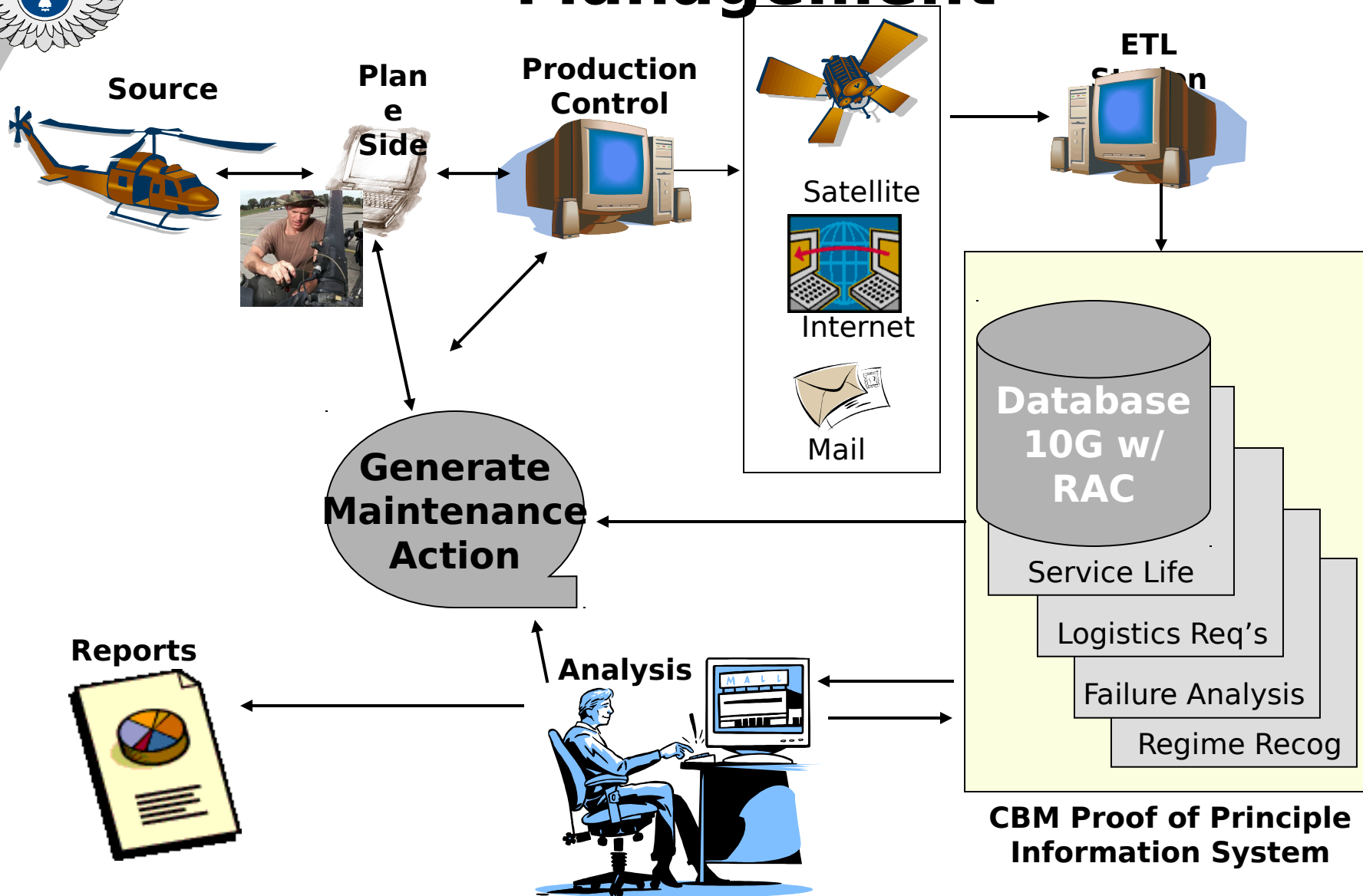


CBM Proof of Principle Architecture





Proof of Principle Data Management





CBM Milestones

- ☑ 21 Oct – Stakeholders Meeting
- ☑ 26 Oct – NCR Senior Leaders (Ms. Leiby, MG Stevenson)
- ☑ 09 Nov – UH60/Navy IDM HUMS Symposium
- ☑ 17 Nov – CLOE Ground Systems Demo
- ☑ **30 Nov – DA Leadership Visit (Mr. Pybus, MS Plummer, COL Smith)**
- 30 Jan – CBM Strategy/Milestones/PCP



Summary

On Track ...

- **Moving Forward With Proof of Principle**
- **Long-term Strategy Is Emerging**
- **Positive Support From Stakeholders**

Challenges:

- **CBM Data and Information Management**
- **Automation Architecture (CLOE, LMP, PLM+, GCSS-A)**
- **Connectivity**
- **Long-term Commitment to CBM Transformation**



Back Ups